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(54) **High flow rate transportable UHP gas supply system**

(57) A high flow rate, transportable, ultra high purity gas vaporization and supply system, comprising:

- (a) a vessel (20; 20') suitable for carrying large quantities of a liquefied gas;
- (b) a plurality of valves adapted to operate with liquid or gas phases;
- (c) a loading/unloading unit (30; 30') disposed on said vessel (20; 20'), preferably at the top of the vessel, for loading and unloading the liquefied gas, the loading/unloading unit preferably including said plurality of valves;
- (d) at least one heater (50; 50') containing one or more heating elements (54; 54') permanently positioned on the vessel (20; 20') to supply energy into the liquefied gas, said heater (50; 50') adapted to cause said liquefied gas to be supplied through said loading/unloading unit (30; 30') as a gas; and
- (e) a heater controller (60; 60') adapted to use process variables feedback for regulating said one or more heating elements (54; 54') maintaining and regulating gas output.

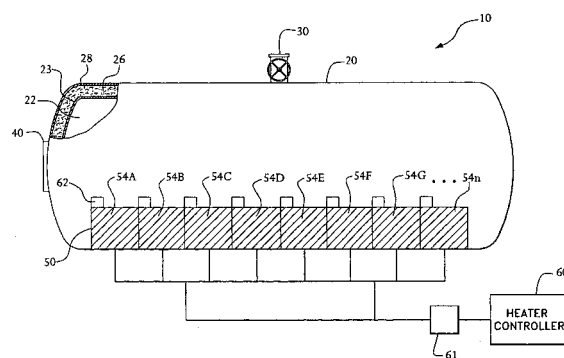


FIG. 1



EUROPEAN SEARCH REPORT

Application Number
EP 10 18 6265

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X,D	US 6 025 576 A (BECK ANTHONY J ET AL) 15 February 2000 (2000-02-15) * the whole document * -----	1-3,5-7, 9,10,14, 15, 18-23,25	INV. F17C9/02
X	US 5 799 640 A (IDEGUCHI TAKAHIRO ET AL) 1 September 1998 (1998-09-01) * the whole document * -----	1,3,25	
			TECHNICAL FIELDS SEARCHED (IPC)
			F17C
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 24 September 2012	Examiner Nicol, Boris
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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EPO FORM 1503 03-82 (P04C01)



Application Number

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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☒ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

1-3, 5-7, 9, 10, 14, 15, 18-23, 25

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).



**LACK OF UNITY OF INVENTION
SHEET B**

Application Number

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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-3, 25

A high flow rate transportable ultra high purity gas vaporization and supply system as claimed by claim 1, and associated method claim 25, further comprising a vessel selected from the group consisting of tube trailers, tankers, and ISO containers.

2. claim: 4

A high flow rate transportable ultra high purity gas vaporization and supply system as claimed by claim 1, further comprising a vessel covered with thermal insulation.

3. claims: 5, 10, 18-20, 22, 23

A high flow rate transportable ultra high purity gas vaporization and supply system as claimed by claim 1, further comprising a plurality of heating elements which are divided into a plurality of heating zones.

4. claims: 6, 7, 9, 14, 15, 21

A high flow rate transportable ultra high purity gas vaporization and supply system as claimed by claim 1, further comprising temperature measurement elements to provide feedback to said heater controller or heater controller includes a programmable logic controller or at least one temperature limit device.

5. claim: 8

A high flow rate transportable ultra high purity gas vaporization and supply system as claimed by claim 1, further comprising quick-connect electrical plug assemblies between the plurality of heating elements and the heater controller.

6. claim: 11

A high flow rate transportable ultra high purity gas vaporization and supply system as claimed by claim 1, further comprising at least one ground-current leakage monitor.



**LACK OF UNITY OF INVENTION
SHEET B**

Application Number

EP 10 18 6265

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

7. claim: 12

A high flow rate transportable ultra high purity gas vaporization and supply system as claimed by claim 1, further comprising at least one over current limit device.

8. claim: 13

A high flow rate transportable ultra high purity gas vaporization and supply system as claimed by claim 1, further comprising heating elements located below a lowest expected vapor- liquid interface level.

9. claim: 16

A high flow rate transportable ultra high purity gas vaporization and supply system as claimed by claim 1, further comprising at least one heater permanently attached to the outer surface of the vessel and positioned between the outer surface and a vessel insulation.

10. claim: 17

A high flow rate transportable ultra high purity gas vaporization and supply system as claimed by claim 1, further comprising a heater controller as a stand-alone unit or part of the system mounted on a vessel frame.

11. claim: 24

A high flow rate transportable ultra high purity gas vaporization and supply system as claimed by claim 1, further comprising a heating element as a resistive heating element or the heater comprising resistance wires, thermocouples, grounding mesh, and an internal thermal fuse.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 10 18 6265

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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24-09-2012

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 6025576	A	15-02-2000	NONE	

US 5799640	A	01-09-1998	GB 2318861 A	06-05-1998
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